



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/711,721 | 09/30/2004 | Cory Wajda | TTCA-002 | 5720 |

| | | |
|--|------|------------|
| 37694 | 7590 | 08/24/2007 |
| WOOD, HERRON & EVANS, LLP (TOKYO ELECTRON) | | |
| 2700 CAREW TOWER | | |
| 441 VINE STREET | | |
| CINCINNATI, OH 45202 | | |

| | |
|--------------------|--|
| EXAMINER | |
| GHYKA, ALEXANDER G | |

| | |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
| 2812 | |

| | |
|-------------------|---------------|
| NOTIFICATION DATE | DELIVERY MODE |
| 08/24/2007 | ELECTRONIC |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dgoodman@whepatent.com
usptodock@whepatent.com

Office Action Summary

Application No.

10/711,721

Applicant(s)

WAJDA, CORY

Examiner

Alexander G. Ghyka

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

ALEXANDER GHYKA
PRIMARY EXAMINER

Av 2812
Alex Ghyka

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Applicants' response of 6/11/2007 has been entered. The rejection of record is withdrawn in view of Applicants' amendments. The following new rejection is made.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2 and 6-16 are rejected under 35 U.S.C. 102(b) as being anticipated Saenger et al (US 2005/0127417).

Saenger et al disclose a field effect transistor with an etched back gate dielectric. With respect to Claim 1, Saenger et al disclose a method for forming a thin k gate and a gate electrode on a substrate comprising depositing a high k dielectric material to form a thick high k layer on a substrate, thinning the thick high k layer across its entire surface to a desired thickness less than a minimum thickness but without complete removal to form a high k layer and depositing a gate electrode on the surface of the thin complete high k area. See page 2, paragraph 21. Saenger et al disclose the use of hafnium oxide as required by Claim 2. See page 1, paragraph 7. Moreover, Saenger et al disclose a thickness of 10 Å as required by Claims 6-7. See Example 1, page 4. Saenger et al disclose an oxide interface as required by Claims 8-9. See page 2, paragraph 24. Furthermore, Saenger et al disclose the use of a plasma process using the gases as

Art Unit: 2812

required by present Claims 10-14. See page 2, paragraph 25. Saenger also discloses reactive ion etching as required by present Claim 15. See page 4, Example 2. With respect to Claim 16, Saenger et al discloses a subsequent wet etching step after the plasma step. See page 4, paragraph 35 and Example 2. Therefore, the afore mentioned Claims are anticipated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 3-5 and 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saenger et al (US 2005/0127417) et al as applied to claim 1-2 and 6-16 above, and further in view of Rotondaro (US 2003/0109106).

Saenger et al is relied upon as discussed above.

However, Saenger et al does not disclose the formation of the high k dielectric layer by thermal CVD or the claimed thicknesses of the high k dielectric layer.

Rotondaro et al disclose a method for forming a thin high k layer comprising providing a substrate in a process chamber, depositing a high k material to at least a minimum thickness to form a thick complete high k layer on the substrate; and thinning the thick complete high k layer to a desired thickness less than the minimum thickness to form a thin complete high k layer. See page 2, paragraphs 21 and 22. Rotondaro et al disclose hafnium oxide (see page 2, paragraph 21), the thicknesses as required by Claims 3-4, 6-7 and 18-19 (see page 2, paragraphs 22-23), and a CVD process as required by Claims 5 and 17 (see page 2, paragraph 22). Moreover, Rotondaro et al disclose an interface comprising oxide as required by present Claims 8 and 9. See page 2, paragraph 19. Furthermore, Rotondaro et al disclose a wet etch as required by present Claim 21. See Figure 1.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to use a thermal CVD process in a process as disclosed by Saenger et al, for its known benefit forming high k dielectric layers as disclosed by Rotondaro et al. The use of a known process, thermal CVD, for its known benefit, forming a dielectric, is *prima facie* obvious, as all of the references pertain to forming and thinning hafnium oxide high k dielectric layers. As such, it would be obvious to use the thermal CVD process of Rotondaro et al to form the dielectric layers of Saenger et al. With respect to

Art Unit: 2812

the thicknesses of the high k dielectric, it would have been obvious for one of ordinary skill in the art, at the time of the invention to arrive at the presently claimed limitations, as overlapping ranges have been held to be *prima facie* obvious. See *In re Wertheim*, 191 USPQ 90 (CCPA 1976).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander G. Ghyka whose telephone number is (571) 272-1669. The examiner can normally be reached on Monday through Friday during general business hours.

Art Unit: 2812

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AGG

August 17, 2007

ALEXANDER GHYKA
PRIMARY EXAMINER

Av 2812
Alex Ghyska